Architectural CONCRETE

Model Testing Basin for U. S. Navy

By Ben Moreell*

THE David W. Taylor Model Testing Basin, recently completed for the U.S. Navy at Carderock, Md., is noteworthy not only for its unmatched facilities for testing ship models, but for the structural and architectural design of its various units. The office, shop and laboratory group, a continuous structure 871 ft. long, is one of the first buildings in this country of its size and complexity to be designed according to the principle of continuity. The Basin building, 1,300 ft. long, which is at the rear of the group has a three-hinged, 110-ft. span barrel-arch roof, 1,188 ft. long, believed to be the first of its kind ever built. These two features—the continuous rigid frame of the multi-story building and the barrel-arch roof—have practical advantages of permitting lighter sections and consequent savings in the cost of foundations and superstructure.

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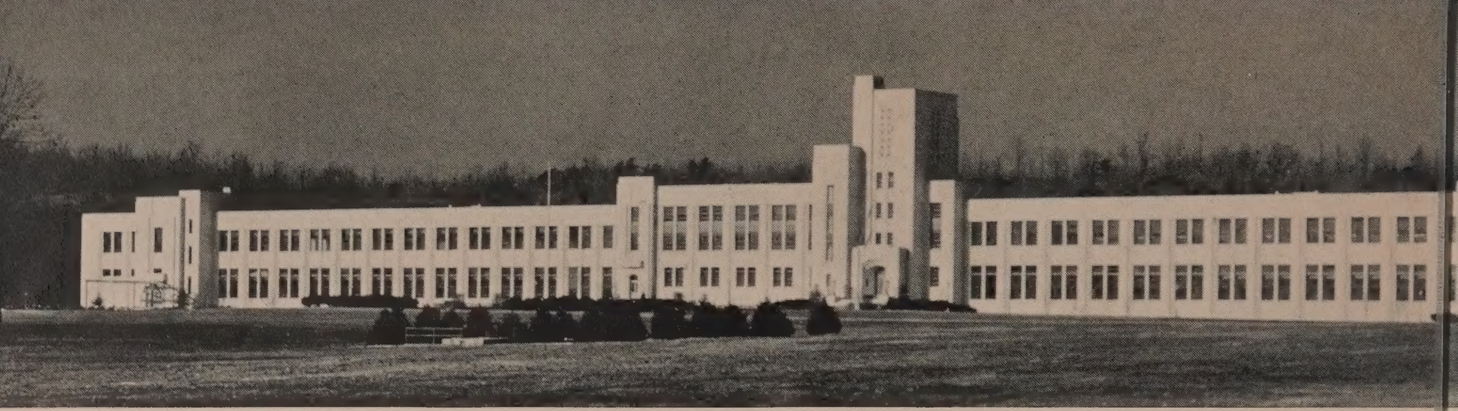
Official photograph United States Navy

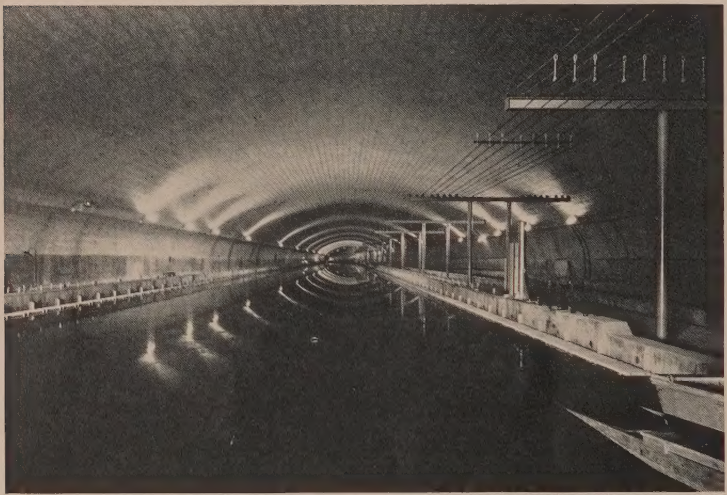
Concrete pylon—north entrance.

Matching these structural innovations is the novelty of the exterior finish and the method of its application. This facing of large, thin panels of especially fine precast concrete, virtually a mosaic made with particles of white quartz, serves a secondary purpose in acting as the outside form for the structural concrete walls. And, as the rigid frame and barrel roof of concrete embody structural advantages, these precast concrete panels embody architectural advantages.

The large panels, which are 2 in. thick and range up to 8x10 ft. in face area, could not have been produced in any other material. The size of the panels permitted joints to be placed where desired for architectural effect and facilitated their erection and use as the outside form for the concrete walls. By reducing the number of joints, large panels also contribute to watertightness. Another practical advantage of the precast panels is that they provide a means of utilizing a great variety of the world's



General view of entire plant layout. The long office building faces south. In th



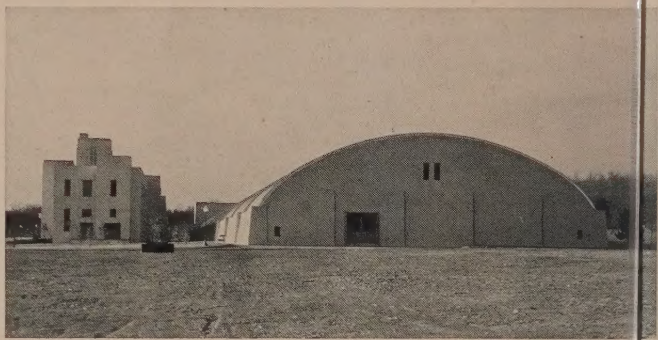
Official photograph United States Navy

Interior view of Basin building.

most beautiful stones for architectural purposes. So far as it is known, quartz was never used for building purposes until it was crushed, graded and put together again in precast panels of concrete. This technique, then, has put at the disposal of architects a group of unusually durable and beautiful stones which for various reasons cannot be fabricated as dimension stone in the usual manner.

Precast concrete for architectural purposes, usually referred to as cast stone, is by no means new. The particular panels used on this project differ from conventional cast stone primarily in the nature and grading of the aggregate, the technique of finish, and the texture of the final surface. A high degree of craftsmanship, extensive plant facilities, and sound knowledge of concrete technique, however, are required for the production of such work. Twenty-eight-day compressive strengths of 7,500 p.s.i. on 2-in. cubes cut from representative panels, reveal the degree of care and skill applied in manufacturing operations. The remarkably pleasing appearance of this work is derived by so carefully controlling the grading and placing of the aggregate particles that when the surface of cement is removed they are clearly and uniformly revealed.

White quartz aggregate used for facing the panels contains a large proportion of $\frac{3}{8}$-in. particles in a mix which, by ordinary standards, would be regarded as quite harsh. By suitable vibration the coarse particles were closely compacted against the mold surfaces, producing a finished surface in which a minimum of cement matrix is showing. Naturally, the size of the predominating aggregate particles largely determines the texture of the finished product. To



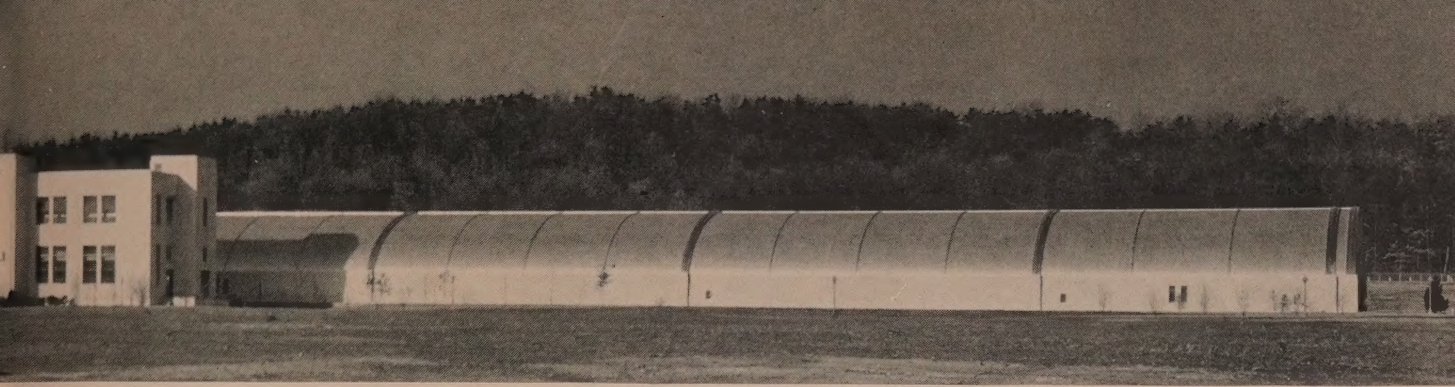
Official photograph United State

East end of Basin building which has cast-in-place concrete walls without cast stone facing.

one observing this type of work for the first time it is surprising that a surface so rough to the touch can appear so even and smooth from a distance of a few feet. That is a matter of proportion and perspective plus uniformity of the panel surface.

Final selection of the texture of the slabs used for the Basin project was made with due consideration for its setting, architectural scale and range of view. For this purpose, and also as a standard for judging material delivered to the project, a sample panel was set up at the job site. This full-sized panel, a regular pilaster section, was considered necessary in order to obtain a true idea of the effect on the finished job. Final architectural results quite fulfill advance expectations.

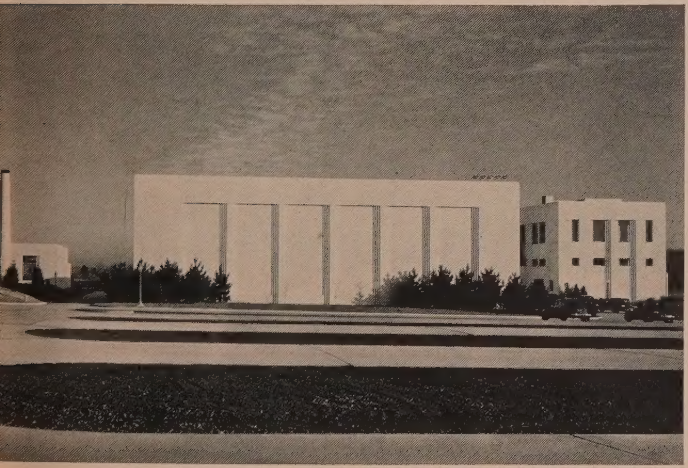
Wall finish in the main entrance lobby and in the museum in the office building reveals the high decorative possibilities of this type of work. The precast panels which form the main field are faced with a light buff colored natural aggre-



Official photograph United States Navy

e much longer Basin building, distinguished by a concrete, three-hinged barrel-arch roof.

gate crushed and carefully graded. These slabs, which are but 2 in. thick, were held to a fairly small size (3x3 ft.) in keeping with the architectural scale of the wall areas. For the same reason the aggregate used in them is smaller than that used on exterior surfaces. The panels are securely bonded to the concrete and tile walls by means of metal ties and grout filler.



Official photograph United States Navy

The turning basin wall at the west end of the structure has the same cast stone details as the office building at right. The power plant is at left.

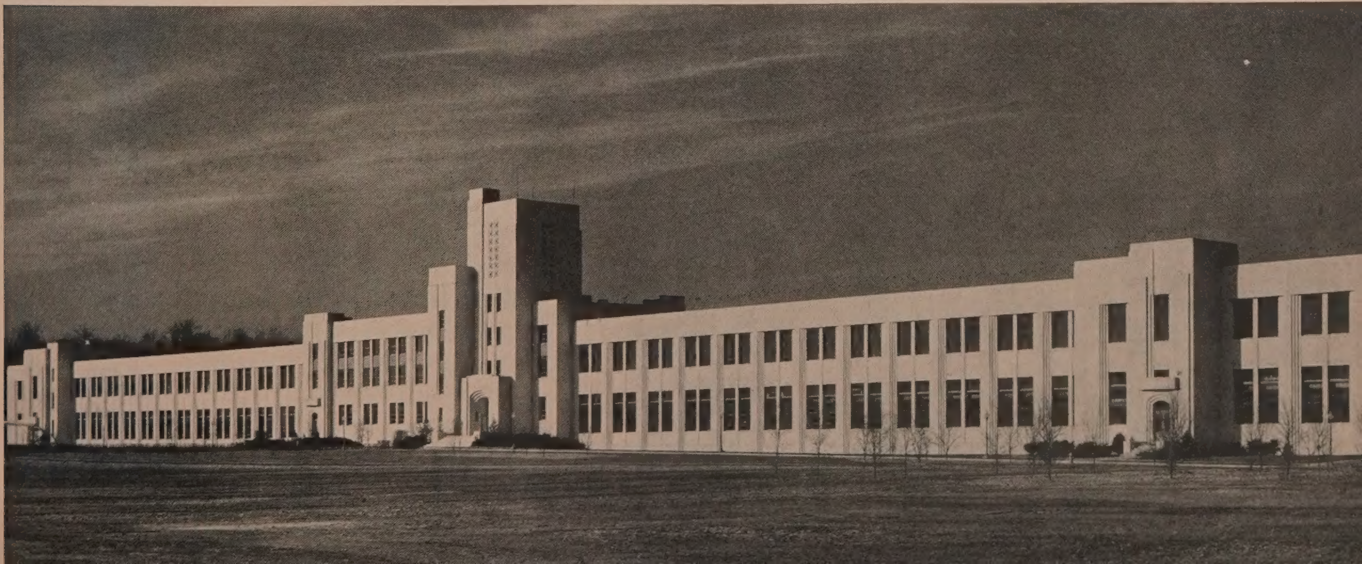
Concrete mosaic designs, executed with manufactured colored aggregates, are used for borders, soffits and other trim. The central decorative feature is a series of six color panels of ships representing definite stages of progress in propulsion and hull design of American vessels along the lines of the research and experimental work to be conducted in the Model Basin. The refinement of these designs and the artistry and craftsmanship necessary for their creation can only be appreciated by seeing them.

Use of precast slabs as forming is simply one expedient for applying decorative finishes to structural concrete. Special and expensive aggregates, white cement or color pigment cannot be used economically throughout 8 or 10-in. walls. They can, however, be used as facing on precast slabs which, in turn, can be applied as exterior facing either by the usual method of veneering or by the unusual method used on this job. It is interesting to note that one-half of the thickness of these slabs was considered effective structurally.

In construction of the exterior walls on all except the Basin building, the facing slabs were set first, with mortar in bed and head joints and the joints plastered over with mortar on the back side. Most of the slabs were either 8 or 10 ft. high, 8 ft. wide and 2 in. thick. Anchor loops consisting of 1x$\frac{3}{32}$-in. galvanized strap iron were molded into the backs of the slabs at 2-ft. intervals each way. The ends of these straps were hooked around the slab reinforcement and

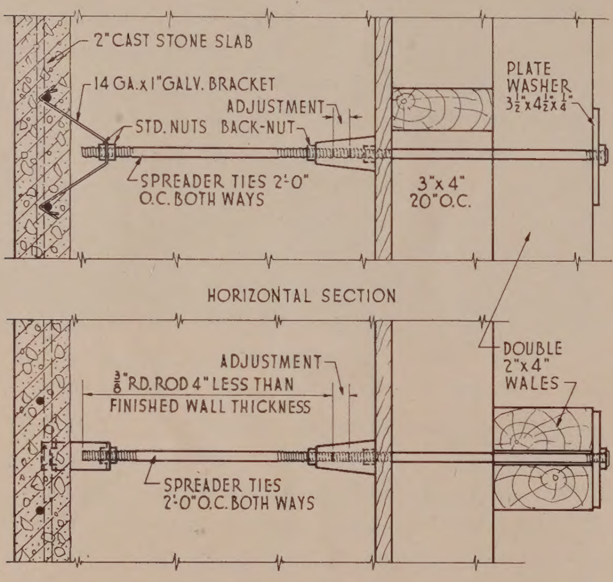
The horizontal feeling of the main building facade is relieved by vertical treatment of openings and the central tower.

Official photograph United States Navy



Official photograph United States Navy

Close-up of form and facing slab showing surface texture produced by the crushed quartz aggregate.

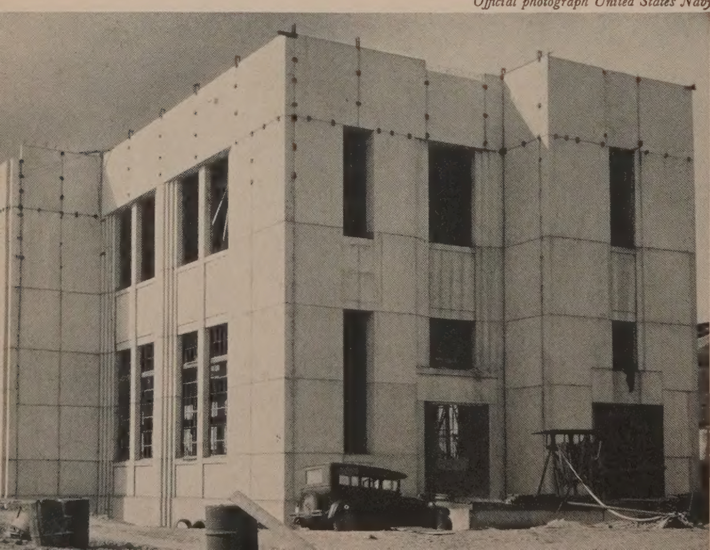


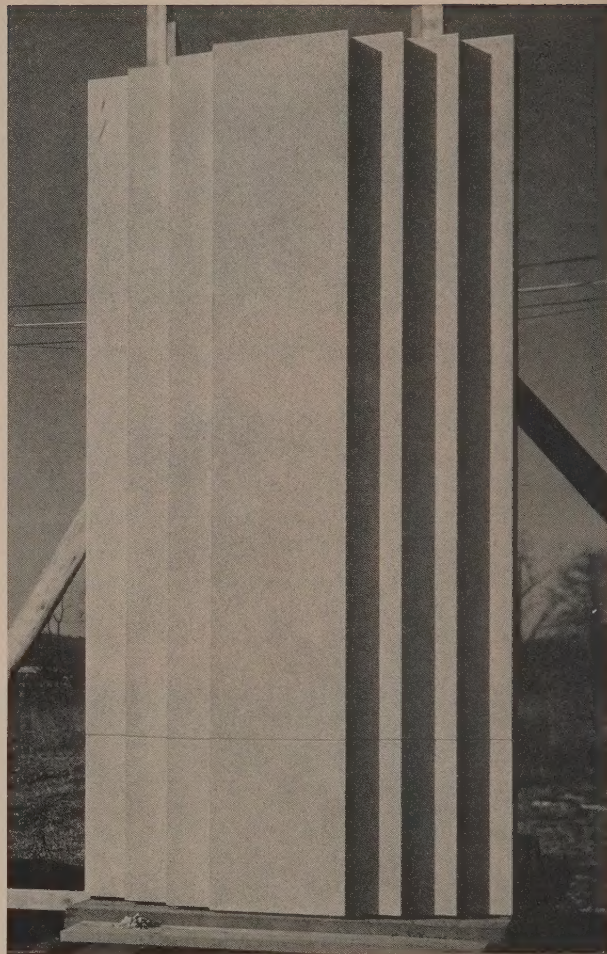
VERTICAL SECTION

Typical sections through wall showing method of tying outside cast stone form and facing to the inside plywood form.

Laboratory building under construction. Supplementary ties through the joints aid in holding meeting edges of panels in line. After the concrete is placed, tie rods are removed and the joints are pointed.

Official photograph United States Navy





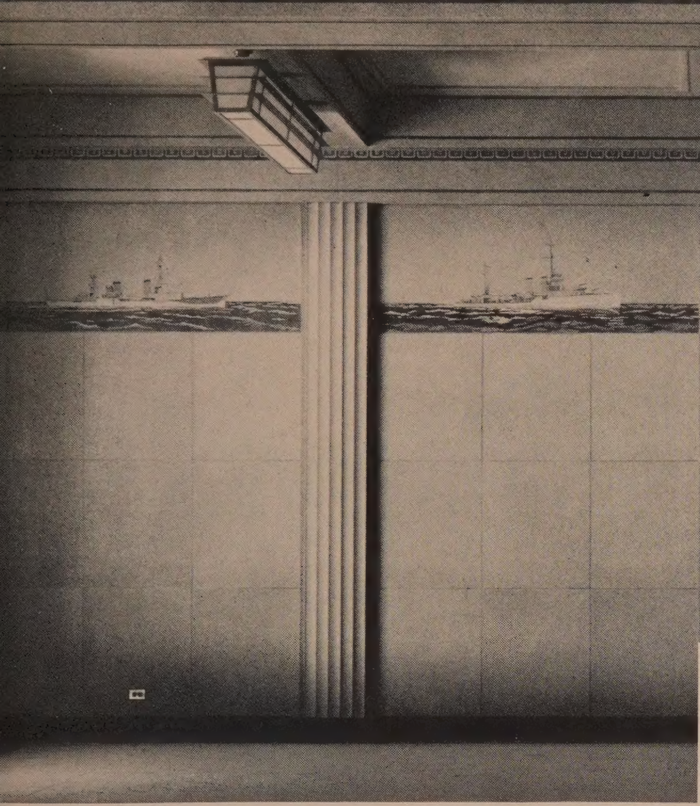
Official photograph United States Navy

A full-sized sample pilaster of precast exposed aggregate panel was set up on the job to show scale and final appearance of the work.

the loop part, which projected 1 in. clear of the back of the slab, was punched to receive the end of a form tie bolt.

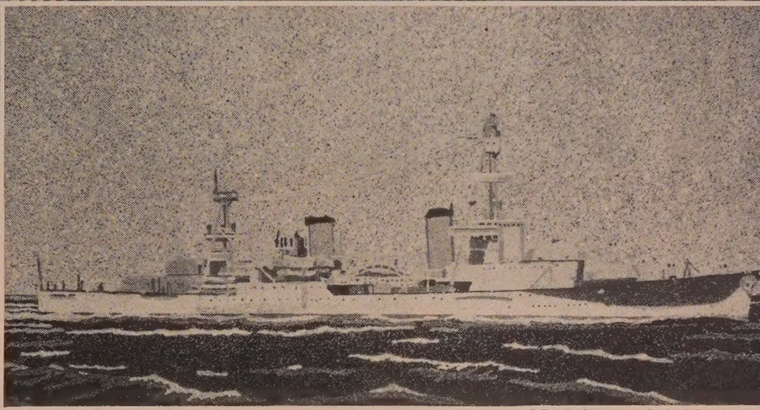
One course of slabs was erected at a time, set true to line and plumb and temporarily braced. Exterior scaffolding was not required, all work being carried on from inside the buildings. Despite their unusually large surface area, even the 8x10-ft. slabs weighed only 2,000 lb. They were easily handled with ordinary stone setting derricks by means of the anchor straps molded into the slab.

In erecting the inside form, a skeleton frame of studs the same size as the facing slab was first set up and braced. Sheets of ⅝-in. thick plywood about 2 ft. wide, after being drilled with holes to match the anchor loops on the slabs, were then dropped into place in front of the studs one at a time. Prior to the placing of the plywood, one end of a ⅜-in. tie rod was fastened to each anchor strap embedded in the back of the slab. A lock nut and an adjustable cone were threaded on the other end of the rod, the cone to serve as a spacer for the inside form. Through the plywood and the

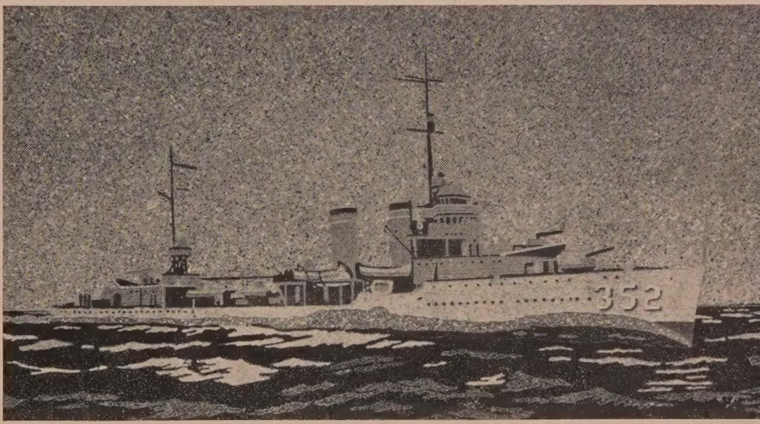


Official photograph United States Navy

East wall of the museum in main building. The walls are exposed aggregate panels with mosaic designs made of manufactured colored aggregate concrete showing progressive stages in development of U.S. naval ships. Below at right are three close-up views of these designs.

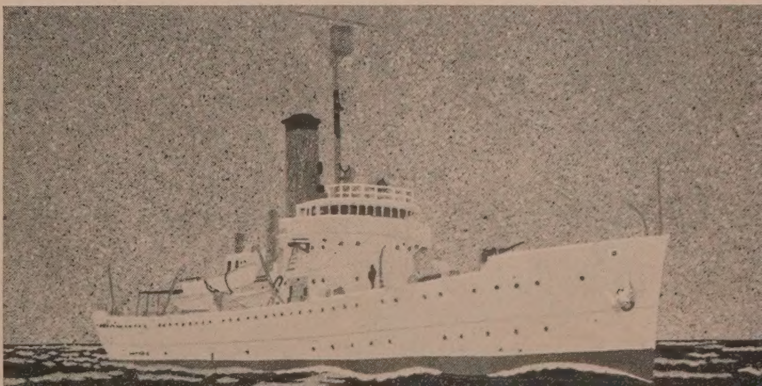


"Salt Lake City"—heavy cruiser, 1929. Official photograph United States Navy



"Worden"—torpedo boat destroyer, 1935. Official photograph United States Navy

"Itasca"—coast guard cutter, 1930. Official photograph United States Navy



supporting studs and wales, another bolt was then threaded into the base of the cone and the whole drawn up tight.

Anchor straps and tie rods at 2-ft. centers vertically and horizontally were computed to be adequate for the pressure of freshly placed concrete 5 ft. in height. In actual practice it was found advisable to place the lower 2 or 3 ft. of concrete and allow it to stiffen before placing the rest of the height of the panel. In later stages of construction, supplementary ties were installed through the joints to hold the meeting edges of the panels in line and the full panel height was placed in one continuous lift.

While precast slabs have previously been used as forming for structural concrete, the projects were not comparable in magnitude to the Model Testing Basin. Moreover, in addition to the newness of this method of construction, the Basin buildings involved special conditions which added to the difficulty of the work such as the unusual height of walls between floors and the heavy, continuous reinforcing. Experience will undoubtedly develop improvements in job practice so that the fullest advantage of "pouring a building into its own skin" will be realized. Those who were connected with the design and erection of this project feel much gratification over its contribution to this new principle of construction.

Lenox School for Boys

By James Kellum Smith, A.I.A.*

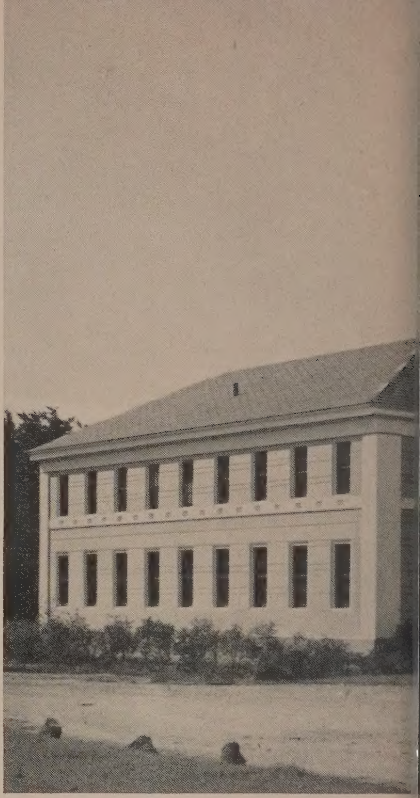
LENOX School for Boys, located in the beautiful, rolling, wooded country of western Massachusetts, has an educational program somewhat unusual in American private school administration. Tuition is relatively low and the boys themselves are expected to keep up their own rooms and do many other tasks about the buildings and grounds that are often done at great expense by a paid staff.

The school for some years had been housed in the frame buildings of an old estate in Lenox township. When new property adjacent to the school was acquired recently it was proposed that an entirely new plant be erected on the basis of one or two units at a time. The architects were asked to undertake the layout of the buildings and to suggest which units should be built first.

In keeping with the economy program under which the school operates, the architects were asked to design, at a minimum cost per boy, buildings which would be firesafe and very easily cleaned and maintained.

In the development of the designs most of the usual types of construction were analyzed on a basis of comparative costs. In carrying their analysis further, the architects decided to investigate the possibilities of concrete wall construction on the same comparative basis. Resulting figures revealed promise of considerable initial economy in the building market of the day through use of concrete. Carry-

*Member, McKim, Mead & White, architects.



General view of Lenox School for Boys, Lenox, Mass. A Colonial design for concrete by McKim, Mead & White, New York City architects, Warren W. Chapin, engineer; it was built by Peasley & Wheeler, contractors of Hampden, Mass. Flat wall surfaces are painted yellow. Trim is white.

Rear of the main building with two one-story classroom wings stepped down from the main floor level.

Simple detail around entrances and in a continuous band beneath second-story sills was formed by plaster and milled wood molds.

ing this analysis forward over a period of years, when additional buildings might be required, it was the opinion of many estimators that proportional saving as compared with other types of construction would increase due to the fact that a large part of a concrete building can be done with common labor which is available at all times.

In addition to its relative economy, concrete seemed to have other advantages. According to reports of tests, it gives an excellent wall, highly resistant to water penetration. It seemed also to open up a number of interesting design possibilities in the way of surface textures and decorative treatment. Although this phase of concrete work has been extensively explored in the design of buildings on the West Coast, there is comparatively little of it thus far in New England. For this reason some people doubted the capacity of this material to stand up satisfactorily under the rigors of New England climate. After considerable investigation, the architects satisfied themselves on this point and decided to adopt architectural concrete construction for exterior walls as well as floor slabs.

The architecture of the plant, indigenous to the region, is Colonial, modified to meet the requirements of concrete construction. The structure in its present form includes a main building for administration and classroom use with some dormitory space on second and third floors, two one-story wings running back from the rear of the main building, and a two-story dormitory wing to the left and front of the main building with which it is connected by a

curved-wall, one-story hall and lounge.

Plywood forms were used for the 8-in. walls above foundations, the smooth surfaces relieved by narrow horizontal rustications which break the wall into alternate wide and narrow courses. Flat wall areas were given a coat of yellow cement paint. White cement paint was used for trim at corner and intermediate pilasters, coping, windows and decorative band below second-story sills.

Restrained molded detail is used around entranceways and in the tower just below the lantern.

Interior walls are furred with 3-in. lightweight concrete masonry units which, except in a few rooms, are exposed and painted. Most of the interior partitions are also lightweight concrete masonry. No plaster was used on the concrete ceilings.

End view of dormitory wing showing curved hallway which connects with main building.

Four 1-in. expansion joints were provided, starting at the tops of footings and extending for the full height of the building. They are located at re-entrant corners to make them inconspicuous, and spaced not over 90 ft. apart.

No particular difficulties were encountered during construction. The building has now been occupied for more than a year with satisfactory results. As a result of this work the architects are convinced that concrete has very interesting possibilities, particularly where economy is especially important, and can be developed further with study and increased experience in the use of the material.

Main building from left. Narrow rustications mark off wall into alternating wide and narrow courses. This building houses offices and classrooms and provides some dormitory space in second and partial third story.

All Souls Church, Alhambra, Calif., is one of two new architectural concrete churches designed for the Archdiocese of Los Angeles by Henry Carlton Newton, architect. Theisen Co. of Altadena, Calif., was the contractor.

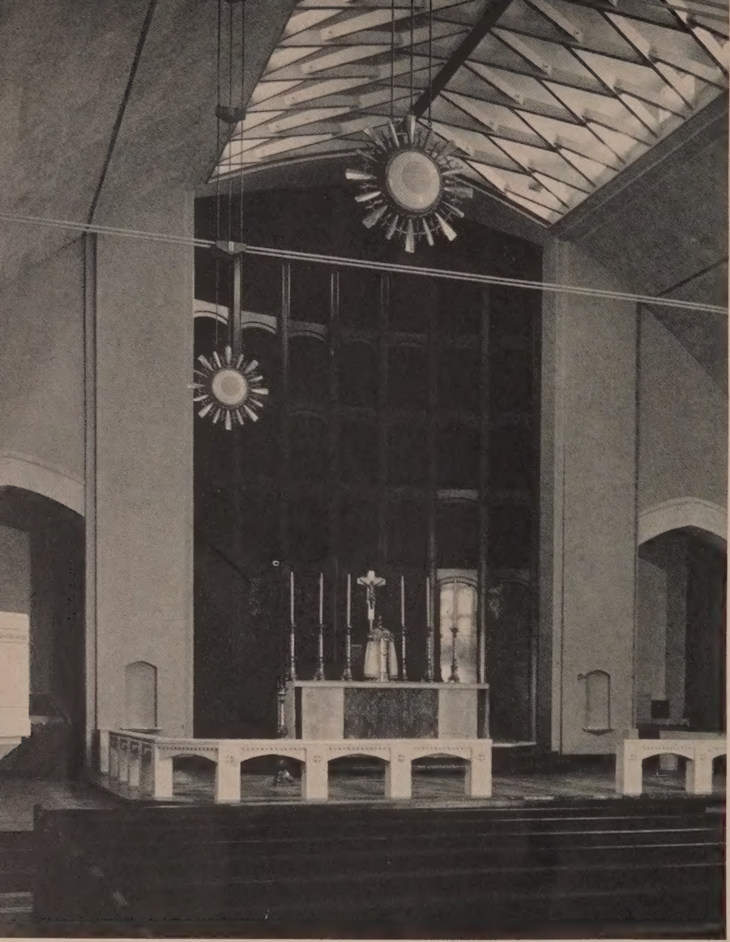
Two Churches for Southern California

By Henry Carlton Newton, A.I.A.

IN the realm of architectural practice ecclesiastical design is one of the most interesting problems confronting the architect. The influence of modern design and material on traditional styles is a factor requiring the most careful and constant study. Balancing of the influence of modern architecture so as not to produce a grotesque style, makes the choice of material one of vital concern.

Using reinforced concrete for church construction gives the designer the opportunity of expressing the modern character of our generation predicated on a material which lends itself readily to "designed architecture".

The steady influence of modern architecture during the past 20 years has, in some instances, so warped the imagination of designers that, when contemporary motifs are applied to ecclesiastical architecture, the devotional character and sacredness of atmosphere is frequently lost in a wild shuffle of horizontal bands, metal trim, wishbone roofs and airdrome facades. Architecture, as all other arts, is the exact expression of the mental, social and spiritual temper of the times that produce it. That modern ecclesiastical



Rail and pulpit in All Souls Church are cast-in-place concrete.

Merle Gage was sculptor of molded figure of Christ on the entrance post.

architecture should be what it is, is eminently fitting. Qualities of trivial fashion and triumphant individualism, however, should not obtain in a portion of a church which we hold to be changeless.

The problem of designing two concrete churches for the Archdiocese of Los Angeles—All Souls Church in Alhambra, and St. Michael's in Los Angeles—called for considerable thought in expressing the modern tendency in architectural design without sacrificing the character of the Catholic tradition.

For the All Souls church, the shape of the property required a somewhat elongated plan, and the fact that there was a large parish school building adjacent to the church influenced somewhat the general shape of the mass.

As a basis of design, the original thought was to comply with all the ancient liturgical requirements of church architecture and bring the Sacrifice of the Mass closer to the congregation by having all the contributing elements in the sanctuary. The placing of the choir directly in rear of the altar and over the priests' sacristy was one of the fundamental changes in the plan in so far as our western churches are concerned. The grouping of the sacristies eliminated the necessity of having an ambulatory, an element which is so characteristic of Catholic church planning.

The church has a width of 69 ft. and an over-all length of 133 ft. Seating capacity is 528 persons in the nave proper with additional seating of 50 in the choir. Nave height is approximately 50 ft. while the tower rises to a height of 105 ft. The roof construction, employing a trussless type of roof, is somewhat unique in church architecture in this region.

The exterior design of the building carries out the general simplicity of the plan, emphasizing the use of concrete as a structural material. It is modern but expresses, in its simplicity, the true purpose of ecclesiastical architecture. Formwork was simple, the vertical feeling in the principal facade being achieved by the mass itself rather than by establishing a sense of direction by means of form marks.

Exterior walls are of hollow reinforced concrete, thus eliminating as much weight as possible because of an un-

satisfactory soil condition. It was necessary to carry the footings approximately 14 ft. below grade until a gravelly loam stratum was reached. The hollow wall construction also provided space for the heating ducts as well as rather deep window reveals which materially aided in the design.

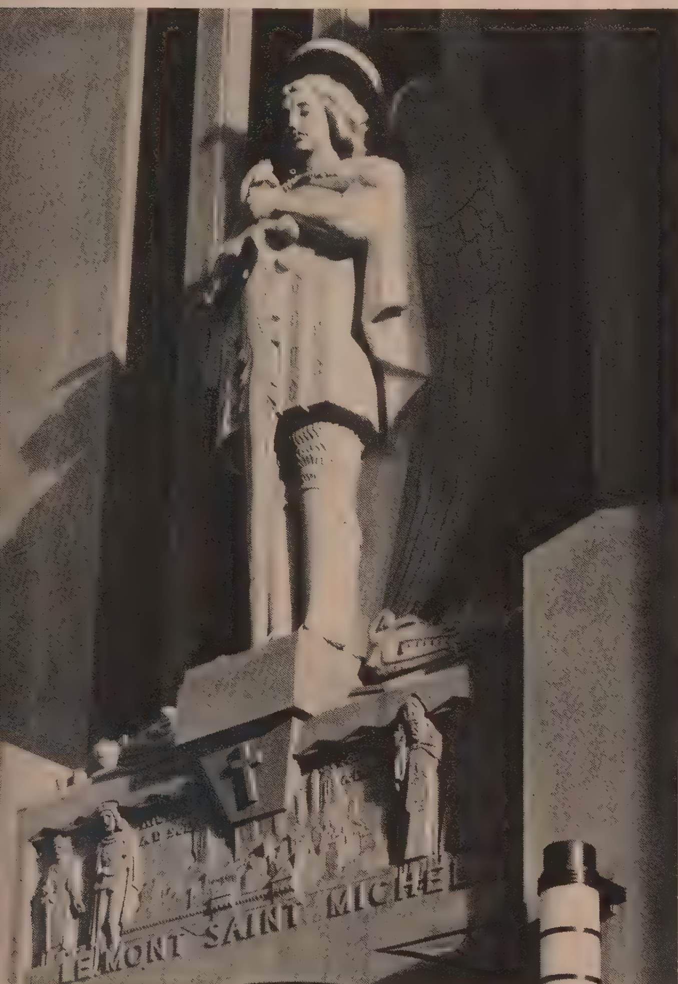
While the exterior was kept simple with very little detail aside from the molded figure on the impost and inscription above the entrance, more extensive plaster mold work was employed throughout the interior. The communion rail, pulpit and brackets for the Stations of the Cross, as well as all the inscriptions, were entirely of cast-in-place concrete. Great care was given to the formwork and the results were entirely satisfactory.

Cost of the church, less heating, lighting fixtures and finish hardware, was $78,000, or about $132 per seat.

St. Michael's church, designed on a somewhat traditional plan, was also restricted by certain property and budget requirements. It is 156 ft. in length and 81 ft. wide, seating approximately 750 persons. There is a large choir loft over the narthex, a somewhat accentuated sanctuary, and boys' and priests' sacristies on either side of the sanctuary connected by an octagonally shaped ambulatory. Three high arches flooded with light through structural glass blocks form the setting for the side altars at either end of the transept.

Particular attention is called to the sculptured relief work on the principal elevation with special reference to the huge figure of St. Michael, all of which was integrally cast in concrete as the various lifts progressed. The skilful use of plaster waste molds gives the designer the opportunity of a sculptured effect at a very low cost. Many, however, overlook the fact that the designing of relief work in concrete requires considerable study and the constant realization that fine undercuts present a certain problem in the use of a plastic material. All the waste molds on St. Michael's church were of two-tone plaster and the interior of the molds was coated with a wax preparation—all of which simplified stripping.

The figure of St. Michael and the detail under it were cast in place in plaster waste molds. A man inside the mold worked the concrete into irregular spaces.



Main entrance to St. Michael's Church, Los Angeles. Architect J. Earl Trudeau was associated with Mr. Newton in the design of this fine building.

Interior of St. Michael's Church showing Stations of the Cross cast integrally with the pointed arch ribs.

In consideration of the engineering design, it was a fundamental requirement that the architecture should be an honest expression of the structural features of the building, and it was determined that the structural features, themselves, should aid materially in the architectural effect. After a study of several different structural systems none came nearer to fitting the purpose of the building than the sweeping, curving lines of the pointed arch.

The building is entirely of reinforced concrete. Eight reinforced concrete elastic arch ribs carry a concrete beam and slab roof construction with a rather steep pitched roof. The side walls are of ribbed construction with the ribs running vertically from the floor to the roof with a horizontal bond beam at the sills of the windows and at the eave line. The ribs were designed as fully continuous elastic arches with partial restraint at the footings and with tie rods in the floor slab to eliminate any tendency of the footings to spread. Tie rods were designed for a low unit stress and were provided with turnbuckles for pre-stressing them before the arch shores were removed. That these precautions were effective was evidenced by the fact that no measurable deflection of the arches could be observed by careful checking when the shores were removed and the roof loaded.

The entire structure was designed for lateral wind and earthquake forces, as required by the Los Angeles City Building Code. This involved little difficulty except in the case of the main nave supports where exhaustive study was necessary due to the complex nature of the many lateral supporting members of the nave frame. The relative stiffness of the arches, the roof slab and the cross walls at the ends of the nave were all considered in determining the load carried by the various members so that no member would be over-designed, but all would be sufficiently strong to withstand any stress to which they might be subjected.

Exposed concrete work was cast in wood forms, and the facing material was T&G boards with rough face next to the concrete surface. Considerable thought was given to the direction of the various form boards to aid in expressing the vertical character of the towers and other portions of the main facade.

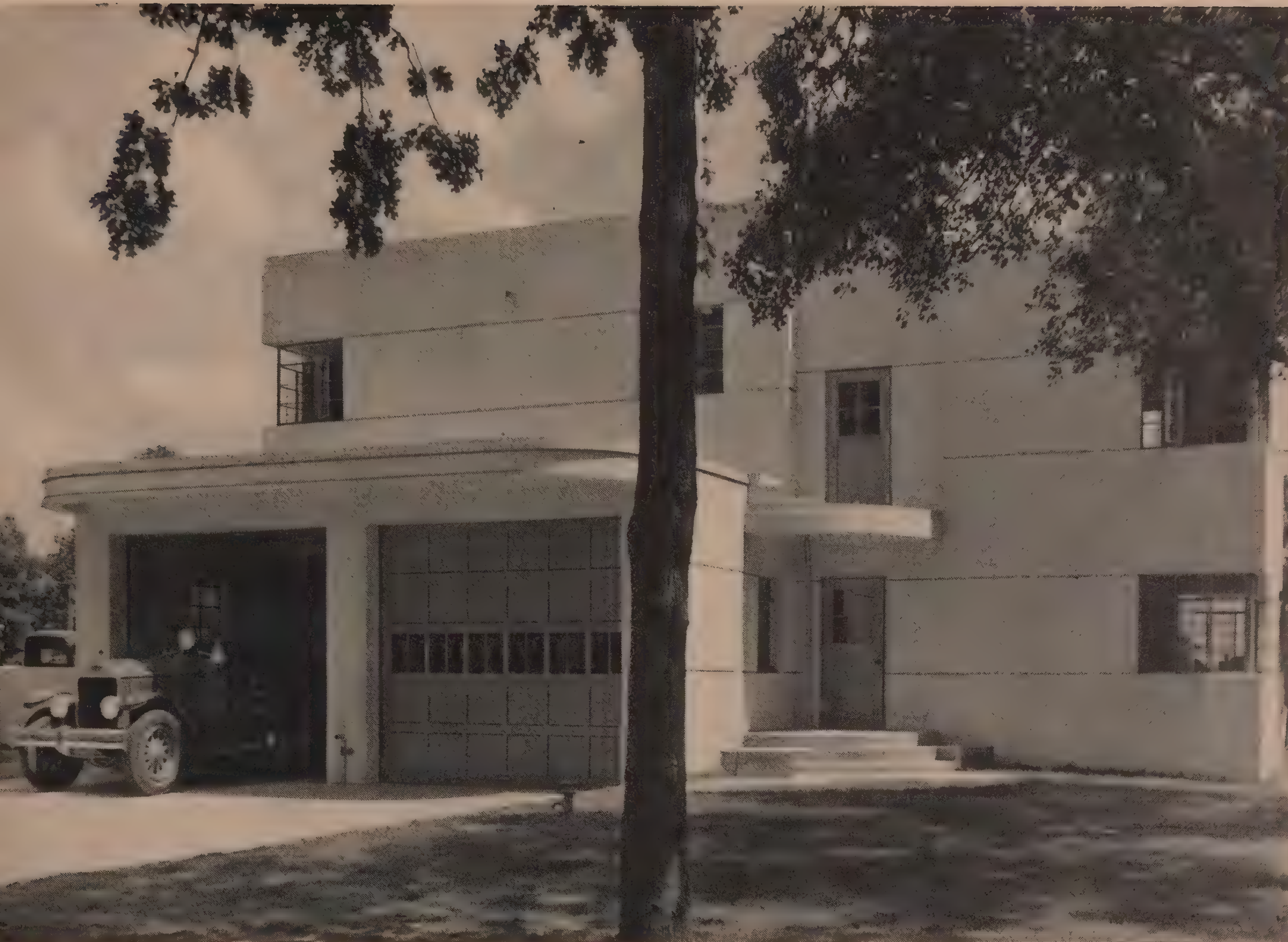
All forms were carefully mitered at both interior and exterior angles.

The arches forming the principal architectural motif of the interior of the church as well as certain other portions of the structure were formed with smooth plywood. Accurate, careful and thorough tying and bracing of forms was a matter of great concern. Form clamps and ties placed through the concrete walls were all sloped down toward the outside at a 15-deg. angle. The rods were pulled from the inside and the holes plugged with composition and finished off with portland cement mortar using a pressure gun. The problem of construction joints was so carefully studied that one is not now conscious of their location.

Placing concrete in the waste molds was most carefully supervised, and it is interesting to note that in placing the concrete in the large figure of St. Michael, the upper third of the form was removed and a man inside the waste mold worked the concrete into irregular spaces by hand. Due to the skilful organization of the contractor and his highly trained crew, the entire structure was placed without a rock pocket that required patching.

Close study of the mass and a skilful analysis of the engineering design brought about astounding economies in cost. The general contract price of the structure was $83,000 exclusive of the stained glass windows, heating, finish hardware and lighting fixtures. The per seat cost of $110 is lower than the cost of the All Souls church since the latter building was more richly finished inside.

J. Earl Trudeau was associated with the writer as architect for both St. Michael's and All Souls churches, and R. Howard Annin was structural engineer for the projects. Theisen Co. was contractor for the All Souls church and W. J. Shirley was contractor for St. Michael's.



The new fire station at Gadsden, Ala., sets an example for the community by being a modern structure of firesafe architectural concrete. Designed by Paul W. Hofferbert, architect, it was erected by WPA labor.

Firesafe Fire Station—Gadsden, Ala.

By Paul W. Hofferbert, A.I.A.

When 2-11 alarms ring these days the firemen of Alabama City, industrial suburb of Gadsden, Ala., rush out of a new firesafe architectural concrete building—a far cry from the rickety wooden structure that housed the department until recently. The new fire station accommodates ten resident firemen, one pumper and one hook and ladder unit. Sleeping quarters and kitchenette are located on the second floor. A lounge and space for equipment occupy the main floor.

In selecting the type of construction there were three determining factors: first, ease in handling due to necessity of using local labor; second, low cost to city; and third, an attractive building requiring minimum expenditure for maintenance. Considering these factors, it was decided a simple, modern design in concrete best fitted requirements.

Containing 57,500 cu.ft., the structure was built at a total cost of $26,500, including the architect's fee. Of this amount the city provided $6,900 and WPA $19,600.

In commenting on the structure, J. H. Meighan, chairman of the City Commission, stated: "We are very well pleased with the new fire station. The city has acquired a permanent building of real beauty, designed to provide adequate fire protection for a growing section of the city. We are definitely planning more improvements of this type."

Architectural CONCRETE

ARCHITECT · ENGINEER · CONTRACTOR

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In Last Issue

We hope the citizens of OMAK, Wash., are not too upset because we spelled the name OMARK for no good reason at all.

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PORTLAND CEMENT ASSOCIATION

33 West Grand Avenue, Chicago

Durable Relics of the First World War

The first 150 days of this second and most strange world war finds the principal theaters of battle scattered over the seven seas, with considerable destruction to shipping of belligerent and neutral nations. This toll of merchant ships has revived once more serious consideration of the construction of reinforced concrete ships by Great Britain, and recalls that the United States built numerous large concrete hulls and barges in 1917-18 in an attempt to boost much needed merchant tonnage.

Although concrete ship construction was an emergency expedient and ended shortly after the close of the war, the hectic efforts of those days to design and build ships of concrete contributed much to the development of concrete technique, and recent press reports about one of those old bottoms prove some interesting points about the durability of concrete.

Attempts to produce dense, lightweight concrete shells for the hulls (they were 3 to 4 in. thick with a maze of reinforcement) brought about some of the earliest practical and large scale applications of the water-cement ratio, use of lightweight burned clay aggregates, and principles of vibration by air hammers. Because of the thin walls and large number of reinforcing bars which interfered with easy placing of concrete, the mixture had to be rich in cement resulting in unusually high compressive strength for that time.

Very few of those ships exist today, but one of them—the Colonel Hodgson of 150-ft. length and 28-ft. beam—has been continuously afloat in salt water since it was slid off the ways. Now anchored in the Chesapeake Bay near Baltimore and used as the floating home of William F. Rennie, retired Coast Guard officer, "there is not a crack in its entire length and the inside is bone dry", according to an Associated Press report of last November 23. Put in drydock once since it was launched just to satisfy the owner's curiosity, the bottom was found to be clean, unblemished and free from growth. Apparently concrete remains sound after two decades in salt water and frequent icy temperatures.

Designed especially to take advantage of the plasticity of concrete is this new auditorium-gymnasium at Belvidere, Ill. The large archway is treated as two cantilevers, divided by a vertical expansion joint over the top of the arch. Designed by Raymond A. Orput, it was built by Hokason & Bloom, all of Rockford, Ill.

Auditorium for Belvidere, Ill.

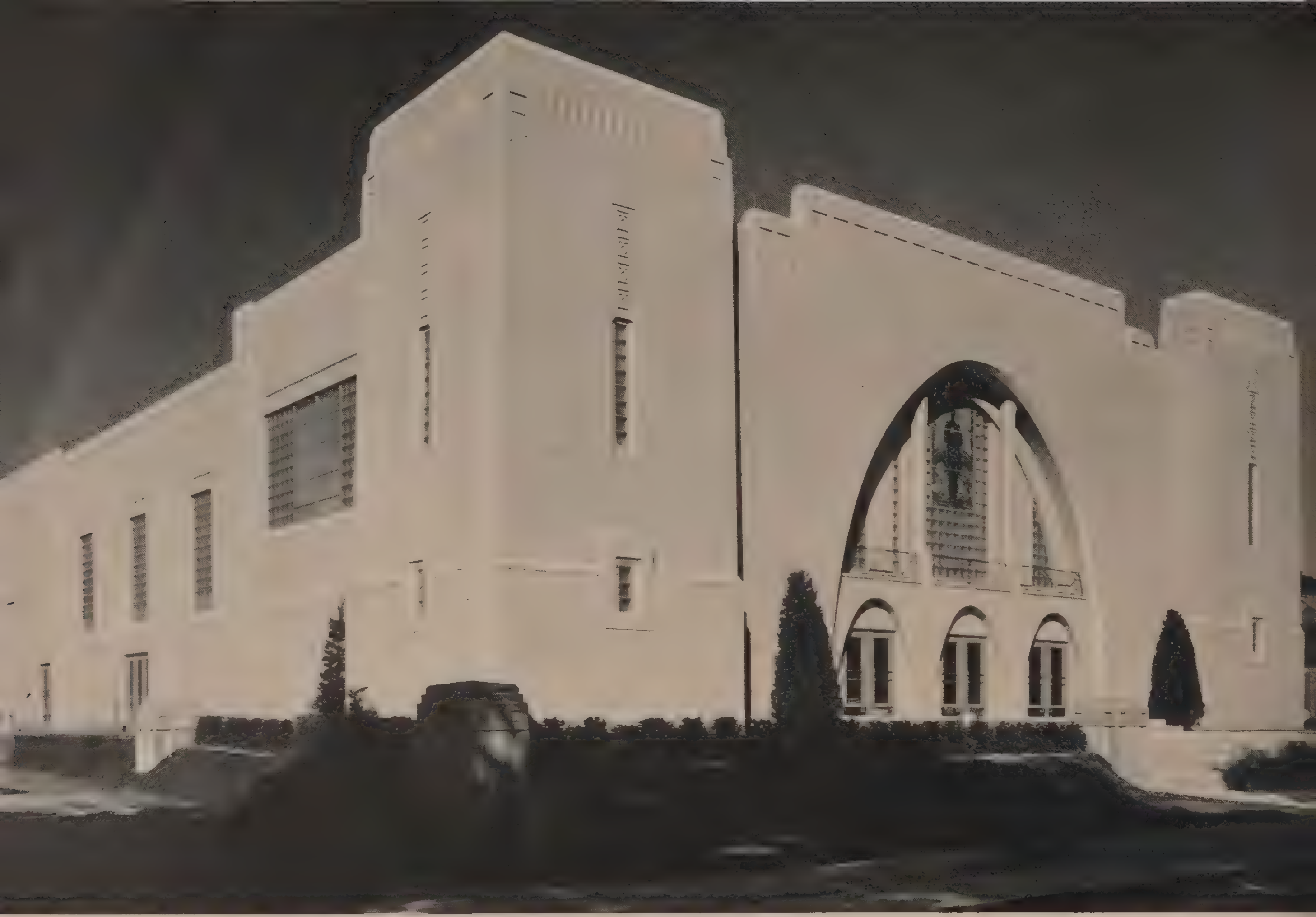
By Raymond A. Orput, A.I.A.

A COMBINATION auditorium-gymnasium erected this past year in Belvidere, Ill., is the final realization of a dream and a design, both of which are 10 years old. The dream came from a long felt need for an auditorium-gymnasium for local high school activities but which could also serve as a community house. Since Belvidere is a town of but 8,000, and the years 1929 and 1930 were very depressing times, the proposed structure could not be built with local funds, and there were no others.

The design was the architect's own enthusiastic dream of what an architectural concrete building should be; and he was particularly anxious to have it built because at that time there were comparatively few architectural concrete buildings east of the Rocky Mountains. It would have been a marvelous chance for a young architect to do something new and different—but since there was no money to build the structure, the plans for what might have been the Midwest's first modern architectural concrete building were put on the shelf.

When availability of PWA funds revived interest in Belvidere auditorium in 1938, the plans were taken out, dusted thoroughly and, strangely enough, they still looked good. It was no difficult task to modify those early ideas, bring the structural design up to date, and project the plan on a larger scale. This was done, plans were approved, and construction started.

When the revised plans and renderings were completed there were some people who said the building would cer-



Citizens of Belvidere waited 10 years to realize the dream of this building, and on three dedication days more than 5,000 of the 8,000 population visited the structure.

tainly cost far more than the budget allowed. How can you build those parabolic archways and batter-wall stair towers, they asked, without very costly labor and equipment? In a community that had previously thought largely in terms of masonry, this misapprehension was reasonable. People unfamiliar with modern concrete construction methods find it difficult to realize that it is possible to execute designs in this medium that could never be attempted in any other known permanent material. Assurances that Belvidere auditorium could be built as designed were backed up by the general contractor's bid. Work proceeded with widespread interest in how it was going and how it would come out.

There are many reasons why architects like to work in concrete. Along with the flexibility that permits free expression of any form, shape or mass, is further assurance that a texture suitable to the design can be molded with the walls. The problem of texture is becoming increasingly important in present-day designing.

As an auditorium the building is designed to seat 1,500 facing a huge stage; 700 of the seats are opera chairs. When the building is converted for use as a gymnasium, temporary seats are removed from the playing floor and bleachers are erected on the stage. The combined seating for athletic events is then 1,600.

For community social events there is a large basement with a lounge and dining room accommodating 500, supplied from a large kitchen.

The building is 103x148 ft. in plan and 42 ft. high from grade. The main entrance opens onto a lobby hall with stairways at either end leading up to permanent auditorium seats which slope from the floor to a level 9 ft. below the ceiling. The pitch of the tiers is sufficient to permit anyone in that section of the auditorium a completely unobstructed view of stage and playing floor.

In the structural design the large parabolic archway in the main facade could not be figured as an arch but as two cantilevered sections divided by an expansion joint. This joint is quite visible at the top of the archway where it is made to fit into the architectural design. Expansion joints also separate the stair towers from the main facade wall and from the side walls.

The central motif of the structure is an art glass window, supported by glass block and framed by the large elliptical arch. At night when this motif is illuminated in blue fluor-

escent lighting it enhances the textural beauty and softness of the entire elevation and provides an arresting contrast to the direct floodlighting.

Plywood forms were used for all exterior walls, wood molds being tacked to the form surfaces to produce the simple dentil bands and plaques over the narrow stairwell windows. The entire exterior was cleaned down and finished with stone grey paint.

Interior forms for exposed concrete were made of dressed T&G lumber, so that the form marks would preserve the scale of these areas. There are expanses of exposed concrete, particularly in the lobby where trophy cases were built into the wall in large circular reveals. The glass over the trophy cases is flush with the wall. The three smaller arches under the main entrance archway form deep reveals both on the exterior and interior walls.

Walls in the lobby are exposed concrete, cleaned and painted. The floor in this area is terrazzo in interesting modern patterns.

An unusual feature of the corridor is its tubular effect, highlighted by indirect illumination and affording a commodious and pleasing entry.

Built by Hokason & Bloom, Rockford contractors, the cost was $143,000, including seating, furnishings, lighting and other mechanical trades. The cube cost was approximately 22 cents, which is considered most reasonable for a building of this type.

Some idea of the interest the public has taken in the new building is the fact that during the three days the building was opened for inspection following the dedication on October 12, 1939, more than 5,000 persons were registered in attendance. Since the population of the town is but 8,000, it is quite apparent that people from miles around came to see the new auditorium.

Concrete walls and ceiling and a terrazzo floor enclose the main entrance lobby. Trophy cases are built into the front wall at left.

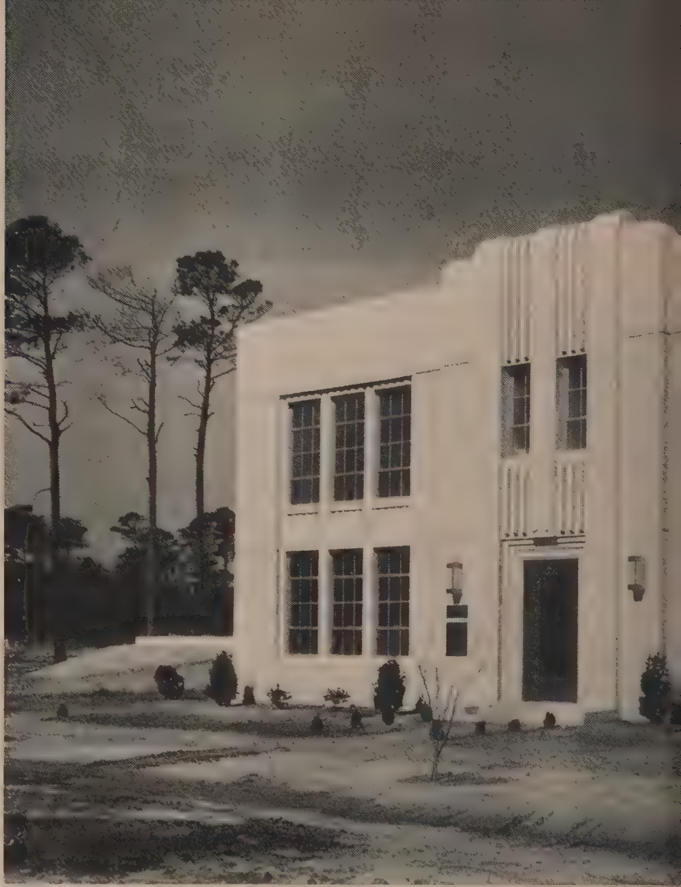
Making the original drawings on this monumental building and then waiting 10 years for the opportunity to build it have been more than justified in the results obtained.

I believe the data collected and the studies being made in this type of construction are opening unlimited fields of development. It seems evident that the surface has just been scratched in discovering the great possibilities of architectural concrete.

Permanent auditorium seating is arranged on inclined tiers permitting everyone an unobstructed view of stage or play floor.

Sewage Plant at Virginia Beach

By Wm. Martin Johnson, Civil Engineer*



To protect increasing throngs of visitors to this popular summer resort, Virg
cleanliness of the plant, architectural concrete was chosen for the control b

SEWAGE disposal to the average citizen is a desirable convenience, but one with which he does not care to be associated. The definite need for modern sewage disposal at Virginia Beach, Va., had become very apparent and the general public was thoroughly conscious the problem should be solved without offense to visitors, or danger to the ocean beach and nearby inland waters.

*Wiley & Wilson, consulting engineers.

Simple decorative detail was molded in the walls as they were cast.

When the question of selecting a building material for the control house came up for solution, it was decided that it must, above all, be one which could be kept clean easily. Its construction cost also must be as low as possible. A light colored material was most desirable to be in harmony with the summer spirit of the beach resort and to give visitors the immediate impression of cleanliness and the effectiveness of modern sanitation.

In view of the great amount of concrete work to be done elsewhere on the project, use of concrete for the building was logical. Uniformity of appearance was desirable and concrete work could be carried on with the same labor employed on the other structures of the plant.

The design called for simple, modern lines free from ledges or harbors for dust and other foreign matter. This was very easy to do in concrete since the accurate, careful formwork necessary for other parts of the job could be extended to the work on the control building. All walls, floors and roof slabs are reinforced concrete except for minor partition walls of lightweight concrete masonry plastered to match the formed surfaces.

...h recently built a new sewage treatment plant. To impress visitors with the ...The entire plant was designed by Wiley & Wilson, consulting engineers.

All exposed surfaces were formed with plywood with construction joints arranged to come in horizontal planes. The joints are concealed in V-shaped rustications dividing the building vertically into three lifts. It was felt that if there should be any variation of color it would occur within these natural divisions of the surface.

Exposed surfaces were finished by rubbing with carborundum stones while the walls were kept wet, and all worked up lather was removed from the wall to insure against scaling. The result was a uniformly smooth, light surface—all that could be desired.

Mechanical vibration during placement produced dense concrete, free of honeycomb.

The control building includes an entrance lobby and stair hall, screen room and grit removal chamber, boiler and pump room on the first floor. On the second floor are a control laboratory, chemical feeders, chemical storage, chlorine feeders, closet space, shower and toilet for the staff.

During its first season in operation the advertising value of this fine looking plant is proving a sound investment for the town, impressing visitors with the modern sanitation and cleanliness of this fast growing beach resort.

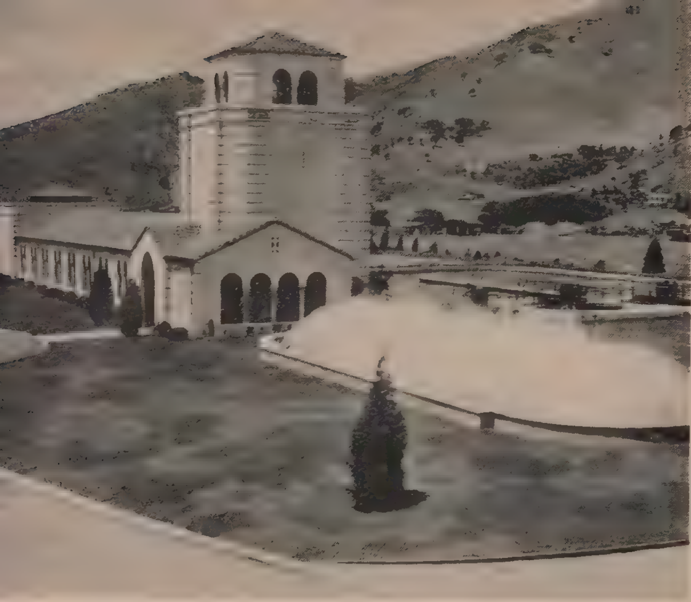
The plant and building were designed by Wiley & Wilson, consulting engineers of Lynchburg and Richmond, and were built by the Tidewater Construction Corp., Norfolk.

A Portfolio of Sewage and Waterworks Plants in ARCHITECTURAL CONCRETE

How architectural concrete is aiding American cities in their quest for improved appearance of sanitary facilities is shown on this and the succeeding two pages. Sewage and waterworks plants illustrated here were selected for geographic distribution and for wide variety in size and design. They are fine examples of what is being done to house important municipal functions in attractive buildings.

—*Editor*.

Settling basins and clarifying tanks as well as the control house are included in the architectural ensemble of the sewage treatment plant at Huntington Beach, Calif. Currie Engineering Co. was consulting engineer and Hoagland Engineering Co., the contractor.



Typical of the architecture of the region is the design of Upper San Leandro filtration plant at Oakland, Calif. Designed by engineering staff of East Bay Water Co., W. W. Wurster, architect, San Francisco; it was built by Bates & Borland, contractors, Oakland.

An Imhoff tank above ground features Rayne, La., sewage plant. L. J. Vorhees consulting engineer. Built by WPA.

Disposal plant at Monticello, Ill., was designed by Building & Engineering Service, Inc. of Decatur, Ill., and built by WPA.

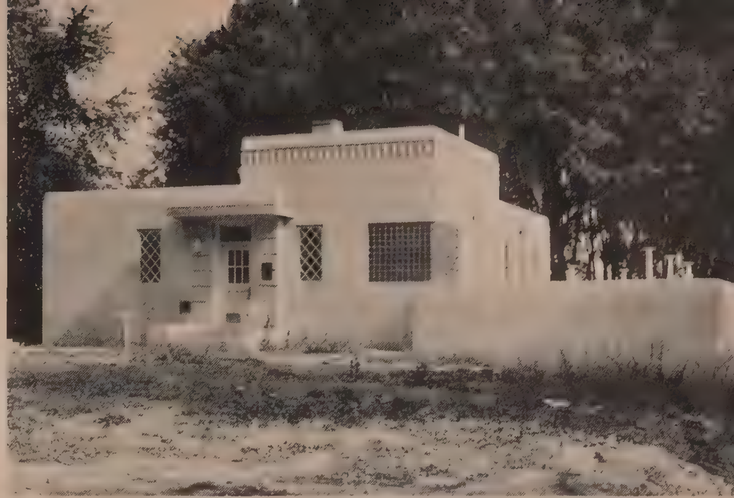
The Osakis, Minn., sewage treatment plant was built in 1939 at a cost of $35,000. G. M. Orr & Co., Minneapolis, designed it and WPA built it.

Water softening plant, Guttenberg, Iowa, designed by Howard R. Green Co., engineers, built by Arthur F. Mathis, contractor.

A new water treatment plant at Forest, Ohio, designed by Champe, Finkbeiner and Associates of Toledo, and built by G. H. Leach Co.

Newest of Atlanta's several sewage treatment plants was designed by Wiedeman and Singleton, Inc., consulting engineers, and built by WPA labor.

ater filtration plant at Faribault, Minn., was designed by Long & horshov, architects, and erected by C. G. Victorson & Co., all of inneapolis.



Waterworks at Frankenmuth, Mich., designed by Pate & Hirn, Detroit engineers, and built by C. H. Donaldson, Melvindale, Mich.

Architectural concrete walls and tile roofs make an interesting head house for Sacramento, Calif., waterworks, designed by City Engineering Dept. of Sacramento; Chas. Gilman, consulting engineer; F. Dean, architect; built by Mathews Construction Co., contractor.

William Dechant & Sons, architects and engineers of Reading, Pa., designed this fine waterworks for Denver, Pa.

wage plant at Boyertown, Pa., designed by William Dechant & Sons, of ading. Thomas Procter was the contractor.

Phoenixville, Pa., sewage treatment plant was designed by Albright & Frick, engineers, and built by Thomas Procter—all of Philadelphia.

First of two schools erected under a new building program at New Albany, Ind., is Corydon Pike School, a modern one-story concrete building. Hawkins & Walker designed both schools. Voight Corp., Jeffersonville, Ind., was contractor for the Corydon Pike project.

Two Indiana Schools

By James B. Hawkins*

WHEN school trustees and advisory board members of New Albany township, Floyd County, Ind., decided to erect a new school building, they were frank to state their desire for a thoroughly practical design that would be economical to build as well as maintain. They were prepared to finance the structure through issuance of bonds.

Endeavoring to meet the requirements of economy and practicality, the architects made drawings for two types of construction—one in architectural concrete and the other in masonry and steel. Purpose of these two designs was to determine the most economical type. From the start it was the opinion of the architect that an architectural concrete building could be built for less money than the alternate design, hence it was not surprising to learn that contract bids on concrete saved the township about $3,364 over the alternate materials.

Construction started shortly after acceptance of the low bid and the structure, known as Corydon Pike School, was completed in August, 1939 in time for the fall term. Containing 6 spacious classrooms and a combination gymnasium-auditorium on one floor, the building accommodates 250 grade school pupils. It replaces an old frame school built in 1904.

Not long after Corydon Pike School was started, the architects were again called in, this time to design other schools as part of a large building and modernizing program. Since the economy of concrete design had been established in the case of the Corydon Pike structure, designs were limited to this material when plans were prepared for West Spring

*Hawkins & Walker, architects.

In the Corydon Pike School gymnasium the concrete beamed ceilings and lightweight concrete masonry walls are painted light buff color.

Street School in another part of New Albany.

This structure, similar to the other, was completed in December, 1939, and contains 12 classrooms and combination auditorium-gymnasium accommodating 480 grade pupils.

Contemporary architectural styles were utilized in both schools, and simplicity was the guiding motif. In each case the exterior walls are reinforced concrete, 8 in. thick, furred on the inside with 4-in. lightweight concrete masonry. Interior walls and partitions are also lightweight concrete masonry, with classroom walls plastered direct. For the sake of variety, gymnasium-auditorium walls are exposed and painted buff. The beamed ceilings in these areas express the purely functional design.

A feature of the West Spring Street building is the use of concrete frame skylights in corridors, the light being admitted through vacuum glass blocks. In both buildings all doors are portland cement and asbestos fiber composition, an important factor in firesafety.

Reinforced concrete slabs 6 in. thick, supported by beams, form the floors over boiler rooms and basement storage spaces. All other floors are 6-in. concrete slabs on fill and consist of a 2-in. layer placed on the ground, a membrane waterproofing and a 4-in. top slab. Floor finishes in both buildings are asphalt tile except in lavatories which, in Corydon Pike School are painted concrete, and in West Spring Street are terrazzo.

Roofs are 3-in. reinforced concrete slabs on concrete columns and beams. In the West Spring Street School copper sidewall flashing extends over the top of the parapet and down the back to within 6 in. of the roof.

Painted with two coats of portland cement paint, the exteriors of both buildings present an appearance of simplicity and dignity wholly in keeping with the conservative-modern style.

Exposed lightweight concrete masonry walls in West Spring Street School reduce reverberation.

Walls were cast in large plywood panel forms with the grain showing for texture. Horizontal strips inserted in the forms produce simple and effective surface details at very small cost. Plaster waste molds were used for the recessed lettering on the Corydon Pike School. Bronze lettering was used on the other school.

General contract for Corydon Pike School was $35,887 with mechanical installations bringing total cost to $47,413. A similar breakdown shows contract cost of the West Spring Street School was $80,500 with mechanical trades making the total cost $109,170. The latter structure was built with assistance of a PWA grant.

During construction of the two buildings the architects received excellent cooperation from Charles B. McLinn, superintendent of New Albany public schools, and Glenn V. Scott, Floyd County school superintendent.

As in the Corydon Pike School simplicity was the guiding motif in the design of the West Spring Street School. The latter was built by Dahlem Construction Co., Louisville, Ky.

Eye appeal as well as strength and firesafety was an aim of Richard Sundeleaf, architect for the Woodbury & Co. warehouse at Portland, Oregon. This structure was built by Wegman & Son, contractors.

Industrial Design for Portland

By Richard Sundeleaf, A.I.A.

Although the interior of the new warehouse built for Woodbury & Co. of Portland, Oregon, is strictly utilitarian in its layout and uses, its exterior is probably different from any other warehouse previously designed. Without recourse to any decorative detail but simply by accentuating structural and functional features and by means of surface texture, a decorative pattern of strong light and shade was created.

The owners, dealers in industrial supplies and heavy hardware, desired a well lighted interior and a good appearance, and they were agreeable to a limited expenditure in excess of the cost of plain flat walls cut with rectangular openings that characterize most warehouses and many other types of structures. With this freedom to proceed, the design was developed that is illustrated in these pages.

Except for the treatment of the entrance, there is nothing in the design that can be characterized as ornamentation. It is solely in the scale and strength of the main structural elements and in the continuity and flow of the horizontal bands which emphasize the repetition of the typical bay completely around the building, that architectural effects were sought. Rounded vertical and horizontal mullions give strength to the entire composition in keeping with the massiveness of the lintel and base.

The building is trapezoidal in plan—196 ft. wide with parallel sides 270 ft. and 292 ft. 6 in. in length. It is one story high, but since railway track and cars may at some

future time be brought into the building, a 22-ft. clearance which is standard for railway cars was adopted for the present truck doorway and height of the window head. Other conditions established clearance beneath roof trusses at 28 ft. To screen these trusses, the walls were carried up to a coping height of 36 ft. above floor level.

The upper portion of the wall is centered on the columns and is 8 in. thick above the truss seats. The continuous window sill is 8 ft. above floor level and the 8-in. wall beneath the sill and between the columns is offset 25 in. from the inner face of the columns. This provides a considerable area for storage purposes beneath the window sills around the building. The typical bay is 22 ft. 6 in. wide, center to center of columns.

The heavy, round-nosed horizontal mullions extending continuously from bay to bay on all sides are spaced to permit the use of standard glass and sash panels one, two and three lights high from bottom to top of opening. This arrangement at the top affords the best interior illumination while the bracing of the columns nearer to the base by these massive struts adds to the impression of rugged strength inherent in the great pier sections.

The light dash coat of portland cement stucco gives a final uniformity of color and texture without effacing the interesting marks left by the forms. Since this finish treatment does not conceal the true structure of the building, it does not weaken the appearance.

Construction was by Wegman & Son of Portland.

Only strictly decorative detail on this building is that about the entrance. The exterior was given a stucco dash finish, producing an interesting texture without disturbing the character of the board-formed surfaces.

Design interest depends on the continuous fenestration and the emphasis of columns and horizontal mullions which produce deep reveals and an interesting pattern of light and shade.

A splendid two-story concrete hospital now replaces an old, small, inadequate structure on the same site in Reed City, Mich. The building was designed by Architect Roger Allen. Osterink Construction Co., Grand Rapids, was the contractor.

Reed City Community Hospital

By Roger Allen, A.I.A.

REED City is a progressive little town of some 2,000 people, located 70 miles north of Grand Rapids, Mich., in the center of an area that boasts some of the best fishing and hunting in America. A few miles out of town in any direction finds swift streams full of rainbow trout waiting to jump into your creel. In the autumn the woods resound with the drumming of partridge. There is larger game also.

But even a community as favored as this one needs a modern hospital, and the hospital facilities in late 1938 were housed in a remodeled residence, inadequate from every standpoint. The city council and a committee of citizens staged a vigorous campaign to raise funds to match a PWA grant, and were successful in December, 1938, at which time the project was approved and contracts let.

The problem was to design a 30-bed hospital for less than $50,000, this sum to include general construction, plumbing, heating, stoker, temperature control, lighting and a nurse's call system. Everyone agreed that it would be a good trick if we did it. It was a good trick—and we did it.

Selection of architectural concrete was a foregone conclusion, for the building must be firesafe, durable and easily kept clean. Furthermore, it was desirable to employ local labor and materials.

Plans called for an L-shaped structure 91 ft. along one street, 74 ft. along another street, with a 40-ft. wing. A problem was to build the new structure while the old hospital—on the same site—was still being used. This was done by building around the older structure and removing it when the new hospital was completed and occupied.

A sloping grade made a two-story building practical without an elevator, for which there was no money available, by placing the ambulance entrance midway between ground and second-floor levels. From this point either floor is made accessible by a non-slip, terrazzo-paved ramp. In

practice this arrangement has worked splendidly.

The building contains three 4-bed wards, six 2-bed semi-private rooms, and six private rooms, a complete surgical suite, labor and delivery rooms, utility rooms, and the usual service rooms such as kitchens, dining rooms, laundry and boiler room.

The structure has a concrete interior frame with two-way floor and roof slabs. Exterior walls are 8-in. concrete, furred with lath and plaster. The 1⅝-in. dead air space behind the lath materially cuts down heat loss. The roof slab was also insulated and plaster was applied directly to the slab, eliminating suspended ceilings.

In my experience with architectural concrete I have found that if costs are to be kept down and full advantage taken of the possibilities of the material, thought must be given in the design to the way the forms will be constructed, for it is the forms that give shape and finish to the exterior surface. In other words, the exterior is designed more or less in reverse. On this job, for example, we proposed to line the forms with ¾-in. plywood, in sheets 4x8 ft. Accordingly, we decided on strong horizontal accents at every 2 ft. of vertical height, thus using the 4-ft. plywood sheets without waste. The only ornamental work used was the concrete grilles at the main entrance, and incised modern letters at the right of the entrance.

Concrete of 3,000-p.s.i. strength was specified, the mix used being approximately 1:2½:3½. Care was taken to assure a sufficient quantity of fine materials (ordinarily removed from the aggregate and sold for plastering sand) being retained in the mix. To this fact I attribute one of the most pleasing concrete surfaces I have ever obtained.

At completion of the concreting, the walls were cleaned with portland cement grout and given a single coat of portland cement and water paint. The final effect has attracted much favorable comment from local citizens and from PWA engineers. Since this was the first architectural concrete building to be erected within 50 miles of Reed City, it has given many laymen an entirely new conception of concrete as a building material.

Construction of the building began on January 2, 1939, in the middle of one of the severest blizzards in recent years. By using high early strength portland cement, heating all aggregates, placing the concrete efficiently and covering it well, the contractor did an excellent job despite the bad conditions. The hospital was completed and occupied late in June.

Osterink Construction Co. of Grand Rapids was the general contractor. The building was erected at a cost of $49,419—well within the $50,000 limit—providing completely modern hospital facilities for this alert northern Michigan town.

he hospital is equipped with the ost up-to-date furnishings and op-ating room facilities.

refully proportioned concrete and ll built forms were responsible for e clean, sharp detail. L-shaped in an, the building was erected around e old hospital which was razed on mpletion and occupation of the w structure.

Uniting seven scattered school districts into one made possible the construction of Oakdale Union School, near Oakdale, Calif. It is a one-story concrete building, strictly functional in plan. Mayo and Johnson, associated architects, were the designers. R. H. Cooley was the structural engineer and John Hackman, the general contractor.

Oakdale Union School—California

By Frank V. Mayo, A.I.A.*

UPON a 9-acre site near the westerly fringe of Oakdale, one of California's growing cities in the fertile San Joaquin Valley, stands new Oakdale Union School—completed at a cost including land, building and equipment, of $281,780. This school district is an amalgamation of seven former school districts, the children being transported from the outlying areas by a fleet of buses. Inadequate and in most ways obsolete, the old two-story brick grammar school at Oakdale will be razed and the site used for other than school purposes.

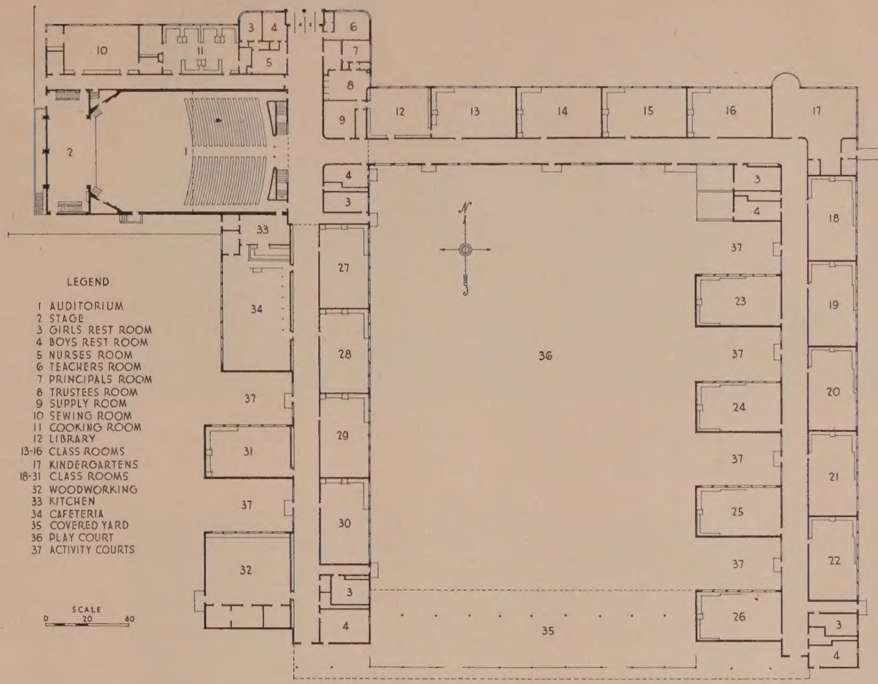
Today 700 children who less than 12 months ago were attending school in small, widely scattered buildings, are housed under the roof of one large, modern architectural concrete classroom and auditorium building the design of which was intended to inspire these future citizens of America. The building has a maximum capacity of 800 and can be extended in an orderly manner as may be required.

Details for two alternate types of construction were submitted to bidders, one based on light steel sections used as studs for lath and plaster walls, and the other based on reinforced concrete walls. No proposals were received on the light steel construction and since the two types were considered to be practically equal as far as cost was concerned, and the concrete design was considered to have certain distinct advantages, the contract was awarded for concrete early in 1939. The building was completed in time for school last September, only nine months after clearing and leveling the site.

The building is 380x300 ft., set back from the sidewalk across a strip of lawn 75 ft. wide. It is U-shaped except for the projecting wing of the auditorium and flanking domestic science rooms. Three 12-ft. wide corridors serve the classrooms about the central court which is approximately 150 ft. wide and 200 ft. long. Across the rear of the court is the covered playcourt. The school provides 18 classrooms of standard size, 23x40 ft., and additional rooms for domestic science, sewing, cooking and homemaking. The kindergarten is located in the northeast corner to provide maximum light and airiness and convenient access to parents

*Mayo and Johnson, associated architects.

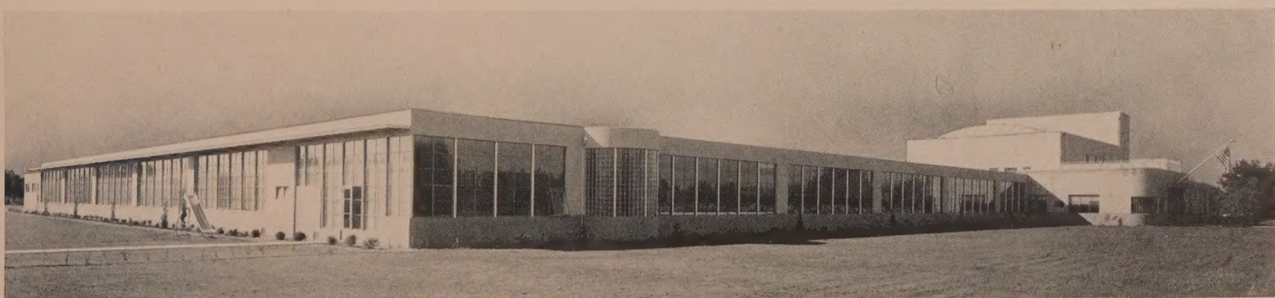
who frequently take their children to school. Manual training shop is located at the rear of the building, and a large, well equipped cafeteria with kitchen is located just back of the auditorium. A door leads from kitchen to auditorium for service in the latter hall when necessary. Administration offices comprise space for superintendent, principal and their secretaries, conference room and teachers' rest room. Near the offices are the library and a nurse's room. Numerous outer doors are provided for rapid exit when the fire alarm is sounded.



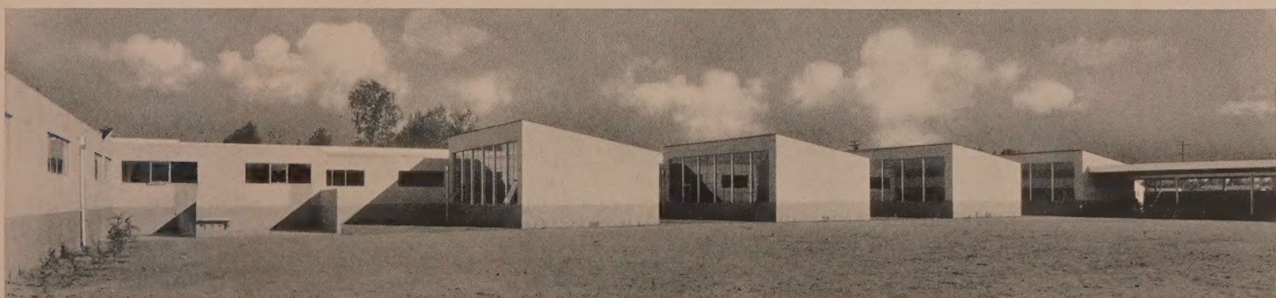
Webster partially defines "function" as the duty or business belonging to a particular station or character. In this strict sense, Oakdale Union School is a functional building and each unit or group of units is planned to do a specific duty. The arrangement of the different grades and departments illustrates functional variations in the plan.

Elementary grades up to, and including, the fourth grade are located in the east wing. Each classroom has a hat and coat alcove for pupils, teacher's wardrobe, and bookcases; shelves and lockers beneath the long window make each unit complete for all the varying activities of the grade. Each room is also equipped with a small sink and drinking fountain.

Grades beginning with the fifth are departmental and classroom hat and coat alcoves are omitted. Lockers are

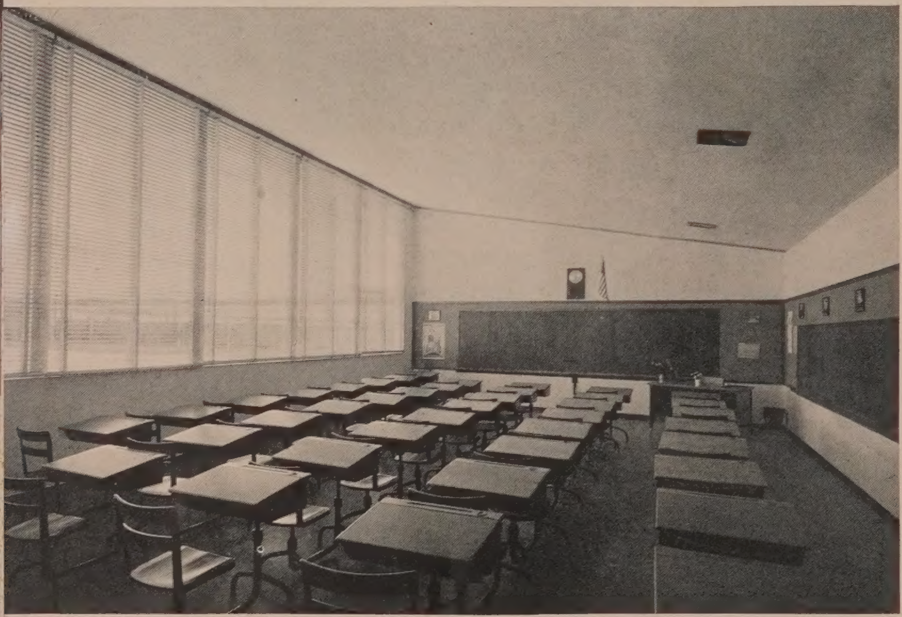


General view of building looking west shows one-story classroom wings and auditorium-gymnasium at far right.



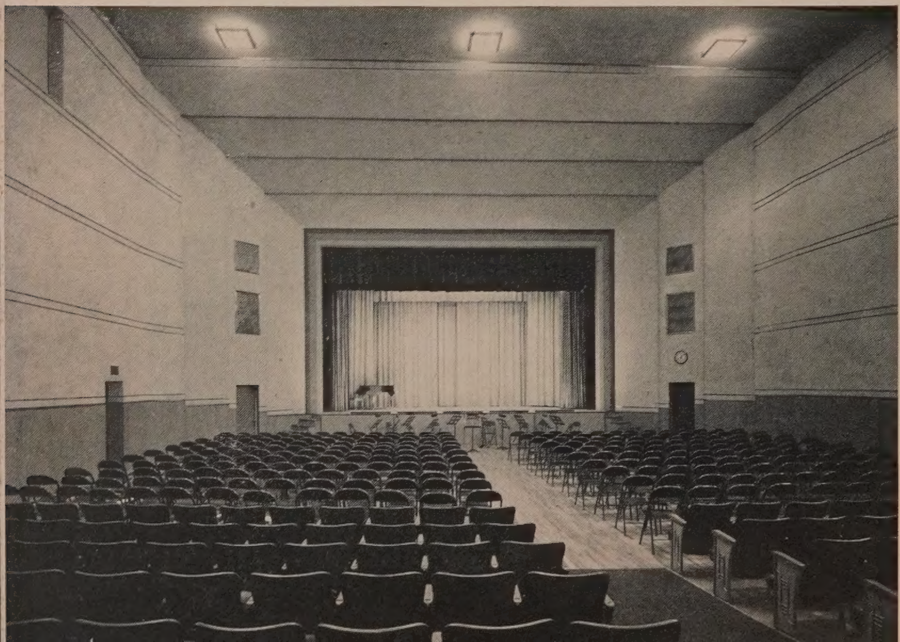
Activity courts separate classrooms projecting from north-south corridors and permit north light to enter these rooms.

The kindergarten room is L-shaped, well lighted with low windows and charmingly decorated with murals depicting the lives of nursery rhyme characters.



Sloping ceilings in classrooms are designed to reflect light down on desks.

Auditorium of Oakdale Union School. Seats in front portion can be removed for dancing or other social purposes.



provided in the corridors convenient to the rooms used by these pupils. Details of arrangement of cabinets and shelving in departmental rooms vary from those of the lower grades, being designed to meet specific needs of each teacher. All conform, however, to the general arrangement providing low, accessible shelves under the windows.

As the classrooms are arranged in the plan according to group and function, so is the play space arranged to serve these groups to best advantage with due consideration to the ages of the children.

The interior court is the play yard for the lower grades where little boys and girls play together. The rear yard, about six acres, is used for the larger children and is accessible from their classrooms just as the interior court is adjacent to the elementary rooms. The large site offered unlimited planning opportunities as well as a challenge to create a building without the usual handicaps of cramped play space, undesirable lighting and poor ventilation.

The U-shape permits admission of either north or east light in every classroom. Most of the rooms in such a plan, normally parallel to the main corridors, obtain north or east light, but as some do not, the expedient of placing a number of classrooms at right angles to the north-south corridors was adopted, giving a unique arrangement which provides north light to each of those rooms. The rooms which project at right angles to the north-south corridors also have planted outdoor lawn courts.

With the exception of the kindergarten, all classroom ceilings slope away from the windows at an angle of about 12 degrees. This was done to reflect the light that reaches the ceilings down upon the desks. It is a well known fact that light entering the upper part of a window is two to three times more effective in lighting the blackboard opposite the window. Other lighting features are the metal venetian blinds in the east rooms which can be regulated several times during the day to provide maximum illumination, and a special diamond-shaped lattice cornice of metal extending the length of each east wall. This grid directs the light inward and cuts off much of the direct sun rays against the glass.

While the entire building was designed and detailed for the purpose of obtaining the most practical school structure, the architects were permitted unusual liberties in designing the kindergarten room. To completely charm the heart of every youngster who enters the room, the entire wall area above the blackboard line is decorated with a mural painting in colors depicting almost life-size scenes from nursery stories. Front windows conform to the main classroom fenestration for the benefit of architectural lines, but the long, low line of the building is effectually terminated by the projecting semi-circular glass brick bay window of the kindergarten which forms an interesting interior play alcove. On the east wall, however, the window sill is lowered 2 ft. further, permitting the tiniest child to see outside.

Exterior walls through the one-story structure are 8-in. thick concrete as are the interior bearing walls. Exterior curtain walls of the auditorium and the one-story interior non-bearing walls are 6-in. concrete. All walls are reinforced. Standardization of classroom plans permitted several reuses of the plywood forms with but minor changes, and an average of four reuses was made of each plywood panel.

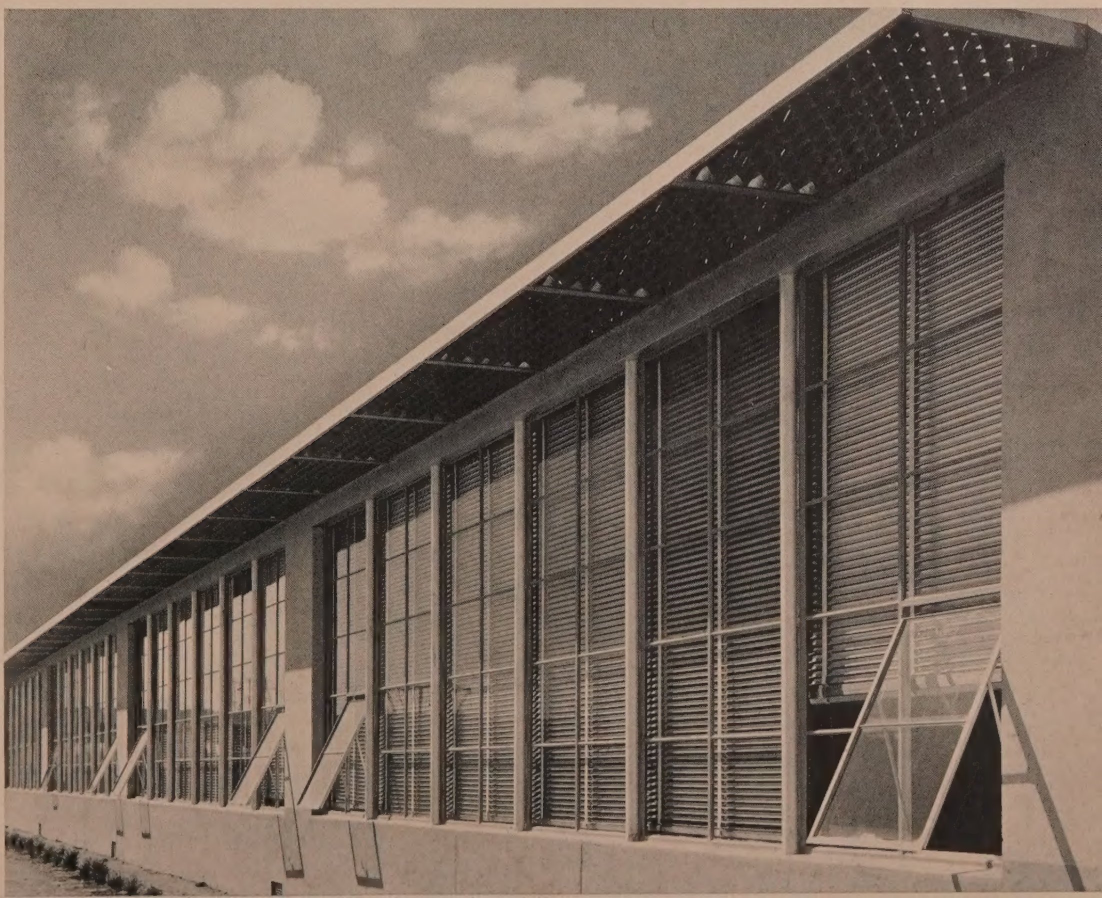
Except for a leveling skin coat, the interior concrete walls were not plastered or furred. This resulted in a definite saving. The exterior walls were lightly honed down without disturbing the form marks, and finished with a pale green stucco wash applied in two coats above the sill line throughout. Lower surfaces were finished with oil paint in a slightly deeper shade of green.

Classroom ceiling construction comprised sloping joists on 24-in. centers, lathed on the underside with 1 in. of insulation and plastered. The top of the joists was sheathed diagonally and roofed with three-ply heavy felt built-up roofing finished with aluminum asphalt-base spraycoat.

Concrete floors are at grade throughout the building and are finished with asphalt tile cemented to the slabs. These tiles are in lightly contrasting colors with borders. Black linoleum is used throughout as a wall base, cemented to the concrete walls and finished off with a small, polished aluminum cap molding. Light fixtures, except in corridors, are recessed into the ceilings and are placed generally about 4 ft. from the inner walls of classrooms.

While a most unusual building has been created here, it has been accomplished with the simplest of materials without special enrichment or ostentation, and without waste. Careful use of form and color has contributed a great deal to the whole. The building cost is 86 per cent of the total, while the equipment, furnishing and seating represents 14 per cent of the cost. Cost of the building, including all equipment, was $248,500 or $4.39 per sq.ft. Building cost was $3.80 per sq.ft. These figures compare most favorably with wood-frame school buildings constructed in accordance with the rigid California School Code and indicate that the effects achieved in Oakdale Union School were not made at the expense of rigid economy.

R. H. Cooley was the structural engineer. John Hackman was the general contractor.



A galvanized iron grille cornice diffuses light entering classrooms. Venetian blinds also aid in light control.

Concrete walls of new Thrifty Drug Store on Lankershim Blvd., North Hollywood, Calif., are marked off in diamond shapes by diagonal rustication lines. Norstrom & Anderson, architects, designed all three of the new Thrifty stores, and Stanley H. Shave Construction Co. was the contractor.

Three New Stores for "Thrifty"

TWO of the most important factors in chain store operation are economy and keen merchandising. Economy comes from mass purchasing, rapid turnover, and lower operation costs. The merchandising, aside from passing on operating economies to customers, involves making products accessible to the public and luring buyers into stores.

Economy and merchandising values are combined in the three new buildings erected for Thrifty Drug Stores in Los Angeles. The first cost of these fine buildings was most reasonable and their day-to-day maintenance is negligible. Their interesting molded facades attract buying crowds.

These stores were designed by Norstrom & Anderson, architects of Los Angeles, and were built by the Stanley H. Shave Construction Co. Both the architects and contractor are long-time users of architectural concrete, but both say they are learning more about this material with every new job. A. E. Norstrom, architect, discussing the variety of molded detail on the three stores, said: "We have made many discoveries in the use of concrete for exterior design, and as time goes on we become more daring in the use of delicate moldings and ornamentation."

The contractor has the same awe that any good craftsman has for a job well done, for he says: "At the conclusion of any concrete job we are always a little amazed that what was a short time ago uninteresting sacks of cement, piles of loose rock and sand, and water, has been mixed and molded into buildings of permanent character and beautiful lines. Concrete surfaces can be made more clean-cut than carved stone; their ornamental detail can be as sharp and clear as a design etched in glass."